

VINEGAR SEED TREATMENT TO CONTROL COMMON BUNT IN WHEAT

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Among integrated bunt management methods, vinegar seed treatment is able to control common bunt in wheat and leaf stripe in barley when used as a seed treatment in doses of 20 ml/kg (Borgen and Nielsen 2001, Saidi et al. 2001). White vinegar now has been approved for use as a seed treatment in organic production in the EU (EU 2019), which makes it relevant to develop the method for practical application. As an objective to further optimise vinegar treatments, dose-response trials with vinegar were done in the period 2017-2020 at Agrologica(DK), AGES(AT), ÖMKi(HU), NARDI(RO) and UBIOS(FR).

The effect of vinegar treatments depends on the concentration of acetic acid, the dose applied, and the duration of the treatment. Too high concentrations doses or durations harm seed germination, because excess liquid is gradually imbibed by kernels and reaches their vital parts. A dose of 20 ml/kg vinegar is enough to cover all parts of the grain, and the grain surface can absorb this amount without excess. When larger seed lots are treated and stored in a closed environment, evaporation of the vinegar is prevented, making the recommended dose and concentration of acid crucial. Post treatment drying may be needed depending on the initial humidity of the seed in order not to affect storability. However, the acetic acid needs time to harm spores, and if re-drying is included in the treatment procedure, it must be postponed some time to let the vinegar work. The more vinegar is applied to the seed, the shorter the treatment duration is needed. A treatment of 40-60 ml/kg without drying will harm germination, but re-drying in a way that seed gets below 2% increased humidity before 60 seconds after application will give full effect without harming germination. Consider that drying is a process that takes time depending on temperature and air flow. Therefore, time specifications must be adjusted individually to the given circumstances and the equipment available.

For larger scale production, equipment for fungicide seed treatment can be used, but for small scale production, spraying vinegar onto seed in a running cement drum or similar can be used for batch treatment.

Vinegar has been shown to control common bunt also in spelt and other hulled wheat species (Borgen unpublished), but the required dose is higher, which is feasible, as spelt can tolerate higher portions of vinegar. However, the optimal dose for hulled species is yet to be determined.

To further improve the method, it would be relevant to test the effect of reduced surface tension additives such as soap, saponin or other natural surfactants, as this may improve surface cover at lower doses. Also, it must be considered that most trials with vinegar have been made on small experimental seed samples, and the effect of scaling up, including the evaporation of acetic acid after treatment must be further investigated if implemented on commercial seed production level.

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References

- Borgen, A., B.J. Nielsen (2001) Effect of seed treatment with acetic acid in control of seed borne diseases. In: Proceedings from BCPC Symposium No. 76: "Seed Treatment: Challenges & Opportunities", eds. A. J. Biddle. BCPC, Farnham, p.135-140. Available at: <https://orgprints.org/1116/1/acidBCPC.htm>
- EU 2019: Commission Implementing Regulation 2019/2164 of 17 December 2019.
- Saidi B, Azmeh F, Mamluk O, Sikora, R. (2001). Effect of seed treatment with organic acids on the control of common bunt (*Tilletia tritici* and *T. laevis*) in wheat. Meded Rijksuniv Gent Fak Landbouwkde Toegep Biol Wet, 66, p.213-21.